DOCUMENT RESUME

ED 357 706 HE 026 456

AUTHOR	Pascarella, Ernest; And Others
TITLE	Cognitive Impacts of Living on Campus versus Commuting to College.
INSTITUTION	National Center on Postsecondary Teaching, Learning, and Assessment, University Park, PA.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	[92]
CONTRACT	R117G10037
NOTE	24p.
PUB TYPE	Reports - Research/Technical (143) -- Information Analyses (070)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Academic Achievement; Cognitive Measurement; Cognitive Tests; *College Freshmen; *Commuting Students; Comparative Analysis; Critical Thinking; Data Analysis; Data Collection; Higher Education; *On Campus Students; *Student Evaluation; Undergraduate Study
IDENTIFIERS	Collegiate Assess Acad Prof Crit Think Test

ABSTRACT

This report sought to test the hypothesis that living on campus fosters cognitive growth by estimating the relative freshman-year gains in reading comprehension, mathematical reasoning, and critical thinking of resident and commuter students at an urban university. Data were collected from 210 college freshmen students at a large research university in Chicago, of which 170 lived off campus. The study involved a pretest-posttest, quasi-experimental design in which comparison groups (residents versus commuters) were statistically equated on salient fall 1991 precollege variables. The data collected included a precollege survey that gathered information on student demographic characteristics and background data, and the Collegiate Assessment of Academic Proficiency, which assesses selected general skills typically obtained by students in the first 2 years of college. Controlling for precollege cognitive level, academic motivation, age, work responsibility, and extent of enrollment, resident students had significantly larger freshman year gains in critical thinking than did commuters. Contains 39 references. (GLR)

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Ernest Pascarella
Louise Bohr
Amaury Nora
Barbara Zusman
Patricia Inman
University of Illinois at Chicago

Mary Desler
North Central College

Mailing Address:
Ernest Pascarella
College of Education (M/C 147)
University of Illinois at Chicago
Box 4348
Chicago, IL 60680

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*This study was supported by Grant No.: R117G10037 from the U.S. Department of Education to the National Center on Postsecondary Teaching, Learning,a nd Assessment.

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Project No.: R117G10037
CFDA No.: 84.117G

Abstract

Controlling for precollege cognitive level, academic motivation, age, work responsibility, and extent of enrollment, resident students had significantly larger freshman year gains in critical thinking than commuters.

A substantial body of research has addressed the educational influence of living on campus versus commuting to college. The clear weight of this body of inquiry suggests that students living on campus are not only more involved in the various educational and social systems of the institution than their commuter counterparts, but they also make significantly greater gains during college on a range of outcomes. These outcomes include: aesthetic, cultural and intellectual values; sociopolitical liberalism; secularism; self-esteem; autonomy, independence, and internal locus of control; persistence in college and degree attainment; and use of principled reasoning in judging moral issues (Anderson, 1981; Astin, 1972, 1973, 1975, 1977, 1982; Baird, 1969; Chickering, 1974; Chickering & Kuper, 1971; Chickering, McDowell & Campagna, 1969; Herndon, 1984; Matteson, 1974; Pace, 1984; Pascarella & Chapman, 1983; Pascarella & Terenzini, 1991; Rest & Deemer, 1986; Rich & Jolicoeur, 1978; Scott, 1975; Sullivan & Sullivan, 1980; Welty, 1976; Wilson, Anderson & Fleming, 1987). Such differences in gains persist even when controls are made for gender, race, socioeconomic status, secondary school achievement, academic ability, and precollege levels of the outcome in question.

Surprisingly, given the above volume of research, almost no attention has been given to the ways in which living on campus as compared to commuting to college influences students' cognitive

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growth during college. The evidence that does exist is indirect and generally inconclusive. For example, in a single institution Winter, McClelland, and Stewart (1981) found that a scale measuring students' involvement in residence hall-sponsored activities had a statistically significant, negative association with gains on a projective measure of critical thinking. They attempt to explain this finding by arguing that a college's residence halls may frequently exert a constraining influence that prolongs an overly protective, in loco parentis environment. Consequently, instead of providing an intellectual by challenging milieu, many residence hall activities may simply provide a comfortable niche that insulates students from the intellectual life of the college. Unfortunately, lack of control for precollege critical thinking means that the results are potentially the result of statistical (e.g., regression) artifacts, as well as other threats such as maturation or selection bias, rather than residence hall participation.

Most evidence on the intellectual influence of place of residence residence focuses on academic achievement, operationally defined as cumulative grade point average. Here the weight of evidence suggests that, when controls are introduced for student background traits and the characteristics of the institution attended, residing on campus, versus commuting to college, has little consistent impact on academic achievement (e.g., Blimling, 1989; Chickering, 1974; Grosz & Brandt, 1969; Pascarella, 1985;

Ryan, 1970; Simono, Wachowiak & Furr, 1984). There is a serious question, however, about the extent to which grades are a reliable, valid, and unconfounded indicator of intellectual or cognitive development during college (e.g., Baird, 1985; Cunningham & Lawson, 1979; Goldman & Hewitt, 1975; Goldman & Widawski, 1976; Prather & Smith, 1976; Theodory & Day, 1985). Although much is known about the noncognitive benefits of residing on-campus (versus commuting to college), the direct cognitive impacts of residential living remain largely uncharted. Given existing theory and evidence, it might be hypothesized that the increased levels of involvement in the educational and interpersonal systems of an institution linked with living on campus would foster relatively greater levels of cognitive growth in residents than would occur in their commuter counterparts (e.g., Astin, 1984; Chickering, 1974; Pace, 1990; Pascarella, 1989). This study sought to test the hypothesis that living on campus fosters cognitive growth by estimating the relative freshman-year gains in reading comprehension, mathematical reasoning, and critical thinking of resident and commuter students at a large, urban, research university in the midwest.

METHOD

Setting

The institutional setting for the study was a large, research I university, located in Chicago. The university has approximately

25,000 students, about 16,500 of whom are undergraduates. The vast majority of undergraduate students live off campus and commute to the university. However, about 1000 reside on campus in a three-year old residence facility that is currently being expanded. The residence facility is physically connected to a large student center and recreational facility, and is in close proximity to the main library as well as nearly all the undergraduate classrooms and laboratories.

It could be argued that an institution with only 1000 of 16,500 undergraduates living on campus may fail to provide a substantial enough residential culture to have much impact on students. However, at the instituton at which the study was conducted, all of the residential students live in close proximity within the same residential facility. Thus, they share not only the same residential space, but also the same dining, recreational, cultural, and study facilities. Such a physical environment is likely to engender the shared student experiences that are the basis of influential student subcultures.

Sample and Instruments

The individuals in the sample were 210 incoming freshmen who were part of a pilot study for a large national longitudinal investigation of the factors that influence learning and cognitive development in college. The research was sponsored by the federally-funded National Center on Postsecondary Teaching,

Learning, and Assessment. The initial sample was randomly selected from the population of students attending precollege orientation. The students in the sample were informed that they would be participating in a national longitudinal study of student learning and that they would receive a stipend for their participation. They were also informed that the information they provided would be kept confidential and would never become part of their institutional record.

An initial data collection was conducted in the fall of 1991. The data collection lasted approximately four hours and students were paid a stipend of $35 by the National center on Postsecondary Teaching, Learning, and Assessment. Students were reminded that the information they provided would be kept in the strictest confidence and that all that was expected of them was that they give an honest effort on tests and a candid response to all questionnaire items. The data collected included a precollege survey that gathered information on student demographic characteristics and background data, and Form 88B of the Collegiate Assessment of Academic Proficiency (CAAP). The CAAP was developed by the American College Testing Program to assess selected general skills typically obtained by students in the first two years of college (ACT, 1990). The total CAAP consists of five 40-minute, multiple choice test modules, three of which (reading comprehension, mathematics, and critical thinking) were the focus of this study.

The CAAP reading comprehension test is comprised of 36 items which assess reading comprehension as a product of skill in inferring, reasoning, and generalizing. The test consists of four prose passages of about 900 words in length that are representative of the level and kinds of writing commonly encountered in college curricula. The passages were drawn from topics in fiction, the humanities, the social sciences, and the natural sciences. The KR-20, internal consistency reliabilities for the reading comprehension test range between .84 and .86. The mathematics test consists of 35 items designed to measure a student's ability to solve mathematical problems encountered in many postsecondary curricula. The emphasis is on quantitative reasoning rather than formula memorization. The content areas tested include pre-, elementary, intermediate, and advanced algebra, coordinate geometry, trigonometry, and introductory calculus. The KR-20 reliability coefficients for the mathematics test ranged between .79 and .81. The critical thinking test is a 32-item instrument that measures the ability to clarify, analyze,evaluate and extend arguments. The test consists of four passages that are representative of the kinds of issues commonly encountered in a postsecondary curriculum. A passage typically presents a series of subarguments that support a more general conclusion. Each passage presents one or more arguments and uses a variety of formats, including case studies, debates, dialogues overlapping positions, statistical arguments, experimental results or editorials. Each

passage is accompanied by a set of multiple choice items. The KR20 reliability coefficients for the critical thinking test ranged from .81 to .82 (ACT, 1990, pp. 11-13, 33).

A follow-up testing of the sample took place in the spring of 1992. This data collection required about 3 1/2 hours and included measures of the students' freshman-year experience and Form 88A of the CAAP reading comprehension, mathematics and critical thinking modules. Students were paid a second $35 stipend by the National Center on Postsecondary Teaching, Learning, and Assessment for their participation in the follow-up testing. The final sample, on which complete fall 1991 and spring 1992 data were available, included 40 freshman students who lived on campus in the university residence facility, and 170 freshman students who lived off campus and commuted to college. This sample of 210 students was reasonably representative of the institution's population of freshman students. However there was some bias. Although the trends were not statistically significant, students in the sample had somewhat higher academic aptitude and were somewhat more likely to be non-minority (i.e., caucasian) than the population from which they were drawn.

Design and Data Analysis

The study design was a pretest-posttest, quasi-experimental design in which comparison groups (residents versus commuters) were statistically equated on salient fall 1991 precollege variables. The dependent variables were freshman-year gains in reading

comprehension, mathematics, and critical thinking--operationally three CAAP tests. The American College Testing Program has developed a scaled score that equates different forms of the CAAP and gives them the same mean and standard deviation. This permits the assessment and comparison of relative group change or gain. Part of gain over time, however, is often an artifact of a person's pretest score, with initially low scorers tending to gain more through regression to the mean than initially high scorers. This means that comparison of simple, unadjusted gains scores could provide a misleading estimate of residential effects if either the resident or commuter groups starts from an initially lower reading, mathematics or critical thinking score in fall 1991. To control for this potentially important confounding influence, it was necessary to statistically equate all students on fall 1991 CAAP scores (Pascarella & Terenzini, 1991). Thus, in the estimation of comparative freshman-year gains in reading, mathematics, and critical thinking between the resident and commuter samples, analysis of covariance was the basic analytic approach taken. Covariates were: fall 1991 reading comprehension, mathematics, and critical thinking scores (each employed in analysis of the appropriate freshman-year gain score); student age; the total number of credit hours for which the student was enrolled during the freshman year; the average hours worked per week during the freshman year; and a measure of academic motivation assessed during the fall 1991 data collection.

The measure of academic motivation was an eight-item factorially-derived Likert-type scale (4 = strongly agree, to 1 = strongly disagree) with an internal consistency reliability of .64. The scale items were developed specifically for the present study,and were based on existing research on academic motivation (e.g., Ball, 1977). Examples of constituent items are: "I am willing to work hard in a course to learn the material, even if it won't lead to a higher grade," "When I do well on a test it is usually because I was well prepared, not because the test was easy," "In high school, I frequently did more reading in a course than was required simply because it interested me," "In high school I frequently talked to my teachers outside of class about ideas presented during class." Only items with varimax rotated factor loadings of .35 or higher were retained in the final scale.

The analysis of covariance for each dependent measure employed a least-squares regression solution and was conducted in a hierarchical manner. The influence of each covariate was estimated while controlling for all other covariates, and the influence of living on campus versus commuting to college was estimated while controlling for all covariates.

RESULTS

Table 1 summarizes the results of the analyses of covariance conducted on freshman-year gains in reading comprehension, mathematics, and critical thinking. As the Table shows, when

students were statistically equated on fall 1991 test scores, academic motivation, age, credit hours taken, and work responsibilities, a significant ($p<.01$) difference was found between residents and commuters in freshman-year critical thinking gains. The differences between resident and commuter reading and mathematics gains were small and nonsignificant.

Table 2 shows mean fall 1991 scores and the mean coveriate adjusted freshman-year gain scores for residents and commuters on all three dependent measures. As the table indicates, on the critical thinking scale, where there was a significant difference attributable to resident or commuter status, the former demonstrated larger average freshman-year gains. The relative gains on reading and mathematics also favored the resident group, but were smaller and not statistically significant. It should also be noted that the larger covariate-adjusted critical thinking gains demonstrated by residents occur despite the fact that residents also had somewhat higher fall 1991 scores on the variable than commuters. This is contrary to what would be expected by regression-to-the-mean and adds further credibility to the proposition that the results represent actual net residence status effects rather than statistical artifacts.

Place Tables 1 and 2 Here

DISCUSSION

This study tested the hypothesis that students living on campus would demonstrate greater freshman-year cognitive gains than similar students who live off campus and commute to college. Controlling for precollege cognitive level and academic motivation, age, work responsibilities, and number of freshman-year credit hours taken, a sample of resident students at a large, urban, research university made larger freshman-year gains on a measure of critical thinking than similar students who lived off campus and commuted to the institution. (Differences between resident and commuter gains in reading comprehension and mathematics reasoning were in the same direction but were small and not statistically significant.) Such findings suggest that residing on campus may enhance the impact of college, not only in areas such as student values, attitudes, personal development, and persistence, but also in student cognitive and intellectual growth.

The findings also suggest that the cognitive impacts of residential living are selective rather than global. Although a significant advantage accrued to residents in the area of critical thinking, the net advantage in reading comprehension was only about half as large, and there was a parity between residents and commuters in mathematics gains. If one considers the content of the dependent measures it is reasonably apparent that the mathematics test taps skills that are taught largely in specific courses (e.g., algebra, trigonometry, calculus). On the other

hand, the cognitive skills measured by the critical thinking test are more general in nature and less clearly tied to specific courses or curricula. This suggests the possibility that residential living may be most influential in fostering cognitive growth in areas that are not closely linked to specific course or curricular experiences. While it should be considered tentative, such a conclusion is nevertheless consistent with the findings of both Pace (1987) and Pascarella (1989) that general cognitive growth during college is fostered not just by coursework and academic involvement, but also by social and intellectual interaction with peers and faculty. The weight of evidence in previous work is quite strong in suggesting that such interaction with peers and faculty is substantially more likely to occur if students live on campus than if they commute (e.g., Chickering, 1974; Pascarella & Terenzini, 1991).

Looked at another way, student cognitive growth may stem from a certain integrated wholeness in the college experience. The conditions for growth are maximized when academic experiences are reinforced through nonclassroom interactions with faculty and other students. Such integration of a student's classroom and nonclassroom experiences during college is more likely to occur in residential settings than when the student lives off-campus and commutes to college.

The results of the study may have additional implications for student affairs professionals, particularly those charged with the

responsibility of residence hall programing. The findings suggest that living in college residences can be a potentially signficant influence on students' intellectual as well as their personal development during college. Thus, a major challenge confronting student affairs professionals is to develop residence programs and interventions that bring the full power of this influence to bear on student learning and cognitive development. A related challenge is to develop programs that bring the educational equivalent of the residential experience more within the reach of those who commute to college.

LIMITATIONS

Clearly this study is limited by the single institution sample and by the fact that it was only possible to follow students longitudinally during their freshman year. It cannot be said unequivocally that the findings will hold in all institutional settings or for longer periods of time. The findings are also limited by an undeniable bias in the sample, those students who volunteered to participate in the study. Although the initial sample was reasonably representative of the entire incoming freshman class, the results cannot necessarily be generalized to those students who did not volunteer to participate. What can be said, however, is that when students <u>in this specific study</u> were statistically equated on precollege cognitive ability, academic motivation, age, work responsibilities, and extent of enrollment

are considered, significantly greater freshman-year gains in critical thinking and reading comprehension are demonstrated by resident than by commuter students.

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TABLE 1
ANALYSIS OF COVARIANCE SUMMARIES FOR FRESHMAN-YEAR GAINS IN READING COMPREHENSION, MATHEMATICS, AND CRITICAL THINKING

	Reading Comprehension		Mathematics		Critical Thinking	
SOURCE	df	F	df	F	df	F
Fall, 1991 Test Score	1	45.86*	1	25.24*	1	17.25*
Fall, 1991 Academic Motivation	1	2.70	1	0.31	1	.98
Age	1	2.08	1	0.26	1	1.88
Credit Hours Taken	1	2.05	1	2.38	1	.66
Number of Hours Worked	1	.61	1	1.63	1	.00
Lived on Campus Versus Commuted to College	1	3.20	1	.05	1	7.37*
Residual	203		203		203	
Total	209		209		209	

*p< .01

TABLE 2

MEAN FALL 1991 SCORES AND MEAN COVARIATE-ADJUSTED FRESHMAN YEAR GAIN SCORES IN READING COMPREHENSION, MATHEMATICS, AND CRITICAL THINKING

VARIABLE	Lived On Campus	Commuted to College
Fall 1991 Score:		
Reading Comprehension	61.38	60.07
Mathematics	60.11	57.92
Critical Thinking	60.17	58.91
Covariate-Adjusted Freshman-Year Gain Score:		
Reading Comprehension	1.43	.73
Mathematics	1.44	1.31
Critical Thinking	2.08*	.02*

*Difference between mean gain scores of students living on campus and students commuting to college significant at $p < .01$.